



# U.S. ANTARCTIC PROGRAM, 2001-2002



The flags of the original twelve signatories to the Antarctic Treaty surround a bust of Admiral Richard Byrd. To the left is the National Science Foundation's main office in McMurdo, known as the Chalet. (NSF photo by Peter West)

The 2001-2002 austral summer brings more than 800 researchers to Antarctica to participate in the U.S. Antarctic Program (USAP) and conduct approximately 148 research projects during the austral summer with some projects continuing through the 2002 austral winter. Supported by over 2,000 civilian contract employees and U.S. military personnel, these researchers will work at the three U.S. year-round stations (McMurdo, Amundsen-Scott South Pole, and Palmer), aboard USAP's two research ships - the icebreaking research ship Nathaniel B. Palmer and the ice-strengthened ship Laurence M. Gould - in the waters of the Southern Ocean, at remote field camps, and with other national antarctic programs at locations around Antarctica.

These projects, funded and managed by the National Science Foundation (NSF), are part of the international effort to understand the Antarctic and its role in global processes. NSF also supports research that can be best or only performed in Antarctica. In addition to the research projects, NSF's Office of Polar Programs (OPP), which manages the antarctic program, supports Teachers Experiencing Antarctica. This program immerses teachers in research as part of their professional development and creates a polar learning community of teachers, students, school districts, and researchers. U.S. Antarctic Program investigators volunteer to include TEA participants in their field parties; NSF selects the teachers competitively. Another OPP program - the Antarctic Artists and Writers Program - provides opportunities for painters, photographers, writers, and others to use serious writing and the arts to increase understanding of the Antarctic and America's heritage there.

The scientists conducting the projects come primarily from U.S. universities and have won NSF support in response to the Antarctic Research Program Announcement and Proposal Guide (NSF 01-81; <http://www.nsf.gov/cgi-bin/getpub-nsf0181>). Operational resources in Antarctica also are used to support scientists from other Federal agencies.

## Highlights

Among the significant research projects scheduled for the 2001-2002 season are:

- **Lake Vostok:** Ice that formed over the last 400,000 years and that had been extracted from the ice sheet above subglacial Lake Vostok in an earlier joint Russian, French, and U.S. project, will be retrieved and analyzed in laboratories in all three countries. Scientists expect to learn more about ancient microorganisms trapped in the ice, and whether they differ from contemporary organisms. The analyses also are expected to provide information about the water in this long-buried lake and the processes that take place on its shores and in its waters.
- **West Antarctica GPS Network (WAGN):** Researchers this season will begin to deploy a series of Global Positioning System transceivers across the interior of the West Antarctic Ice Sheet — an area approximately the size of the contiguous United States from the Rocky Mountains to the Pacific coast. The ability to measure the motions of the Earth's crust in the bedrock surrounding and underlying the West Antarctic Ice Sheet is critical to understanding the past, present, and future dynamics of the ice sheet and its potential role in future global change scenarios, as well as improving the understanding of Antarctica's role in global plate motions. WAGN will complement existing GPS projects by filling a major gap in coverage among several discrete crustal blocks that make up West Antarctica — a critical area of potential bedrock movements.
- **International Transantarctic Scientific Expedition (ITASE):** The U.S. component of the multi-year International Transantarctic Scientific Expedition (U.S. ITASE) will carry out, this season, the third in a series of four traverses over the West Antarctic ice sheet. The broad aim of US ITASE is to develop an understanding of the last 200 years of past West Antarctic climate and environmental change. ITASE is a multidisciplinary program that integrates remote sensing, meteorology, ice coring, surface glaciology and geophysics. This year researchers will continue to collect shallow ice core and snow pit samples for various ice chemical analyses, shallow and deep radar data to look at internal layer reflections and bedrock topography, atmospheric samples, and meteorological readings to understand the current climate of the ice sheet. These data will contribute to a better understanding of the West Antarctic Ice Sheet both today and in the recent past.
- **Killer Whales:** Working aboard a U.S. Coast Guard icebreaker, scientists for the National Oceanic and Atmospheric Administration (NOAA) will obtain tissue samples from live, free-swimming killer whales to determine whether a group of whales, discovered 20 years ago in the vicinity of McMurdo Station, constitute a new species. The Antarctic whales generally are smaller than other killer whales and display a different color pattern.

• **Laser Mapping:** As part of a partnership with the U.S. Geological Survey, NSF is collaborating with NASA during the 2001-2002 field-season to test a scanning laser altimeter system in The vicinity of McMurdo Station. The data collected will be used by NSF researchers studying biology, geology, and glaciology and by NASA's ICESat team to assist in the calibration of their data.

• **Southern Ocean Global Ecosystems Dynamics (SO GLOBEC):** Two U.S. Antarctic Program research ships - the icebreaking research ship *Nathaniel B. Palmer* and the ice-strengthened research ship *Laurence M. Gould* -will conduct five cruises in Marguerite Bay on the Antarctic Peninsula region. A continuation of research undertaken in the 2001 research season, the new cruises will deploy a series of moorings, which will include current meters, sensors to measure salinity, temperature and zooplankton concentration, upward-looking acoustic sounders to track ice motion, and acoustic Doppler current profilers.

• **Historic Huts:** Researchers will study the biological and non-biological agents responsible for causing deterioration in a series of historically significant huts built by Antarctic explorers in the early 20th century. Over the past 90 years, the extremes of the polar environment have protected some of the artifacts in the huts from rapid decay, but conservators have become concerned about degradation of these important historical, archaeological sites. They will study the mechanisms and progressive sequence of events taking place during decay processes, test methods to be used to control future deterioration, determine the extent of environmental pollutants in soils at the historic sites, and evaluate chemical spills within the huts.

• **South Pole Astrophysics:** Several telescopes located at the South Pole will continue their investigations into the origins of the universe, including the Degree Angular Scale Interferometer (DASI). Results from DASI last spring helped show scientists evidence of how the universe looked in its infancy. In addition to scientific research, construction of a new elevated building to replace the existing Amundsen-Scott South Pole Station will continue. The construction of exteriors of wings that will house station services, medical facilities and science labs will begin, with the interiors being completed during the next austral winter. The station is scheduled for completion in 2006.

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Sites of major activities

